

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF ENERGY RESOURCES
Elizabeth Mahony, Commissioner

DEPLOY!:
**Bringing GWs of Energy Storage
Online in Massachusetts**

2024 U.S. DOE Energy Storage Financing Summit
Tom Ferguson, PhD
Energy Storage Programs Manager
October 10, 2024

Outline

- History of Energy Storage in Massachusetts and Current Landscape
 - Key challenge to deployment: **Financing**
 - Key incentive program for energy storage systems: **Clean Peak Energy Standard**
- Future of Energy Storage out to 2050
 - Key Findings from 2024 *Charging Forward* Study
 - **\$50M** Energy Storage Grants Program in 2025

Introduction to DOER



Executive Office of Energy and Environmental Affairs (EEA)

Massachusetts Department of Energy Resources

**Green
Communities**

Cross-Divisional Support
Federal Funding, Energy Security, Engagement, Legal, Finance

**Policy, Planning,
and Analysis**

**Leading by
Example**

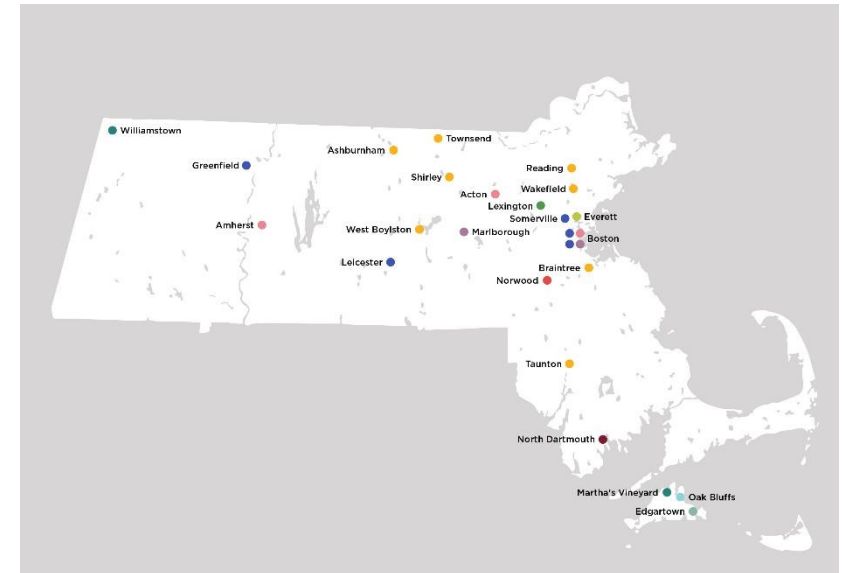
**Renewable and
Alternative Energy**

**Energy
Efficiency**

History of Energy Storage Programs in MA

- **Energy Storage Initiative (ESI)**
 - **2016:** Published *State of Charge* report, which firmly established the many value propositions of energy storage
 - **2017:** Created the \$20M Advancing Commonwealth Energy Storage (ACES) program for MassCEC to fund demonstration projects for a range of promising energy storage use cases discussed in *State of Charge* report
 - **2018:** established a **target of 1,000 MWh** of energy storage by **December 31, 2025**
 - **2024:** Have **569 MWh deployed**; 8,806 MWh in the pipeline
- **Incentive Programs**
 - **SMART Energy Storage Adder (2018)**
 - **ConnectedSolutions (2019)**
 - **Clean Peak Energy Standard (CPS) (2020)**
- **Charging Forward Study (2024):** Report and underlying Study on the state of energy storage deployment, benefits, and use today and the potential roles of mid- and long-duration energy storage technologies (i.e., > 4 hr.) as we meet our decarbonization mandates and transform our electric grid

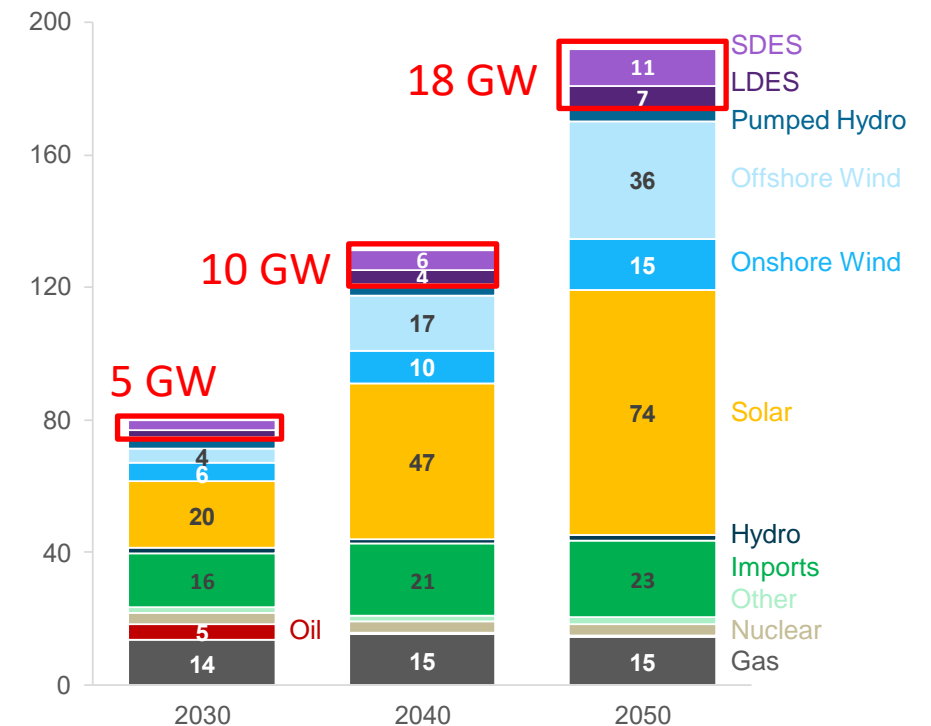
ACES Installations



Energy Storage as a Key Decarbonization Tool

- **Clean Energy and Climate Plan for 2050 (CECP):**
Lays out Commonwealth's Plan to achieve Net Zero in 2050 in an equitable and just manner
 - Calls for collective GHG emission reductions of 85% relative to 1990 levels
 - Electric sector reduction of 93%
 - Requires 2.5x increase in electric sector load relative to 2020 and over 50 GW of solar and wind for MA
- Energy storage is key to meeting Net Zero goals, and GW-scale deployment is necessary in coming years and decades

Installed Electric Capacity in New England
CECP 2050, Phased Scenario
(GW)

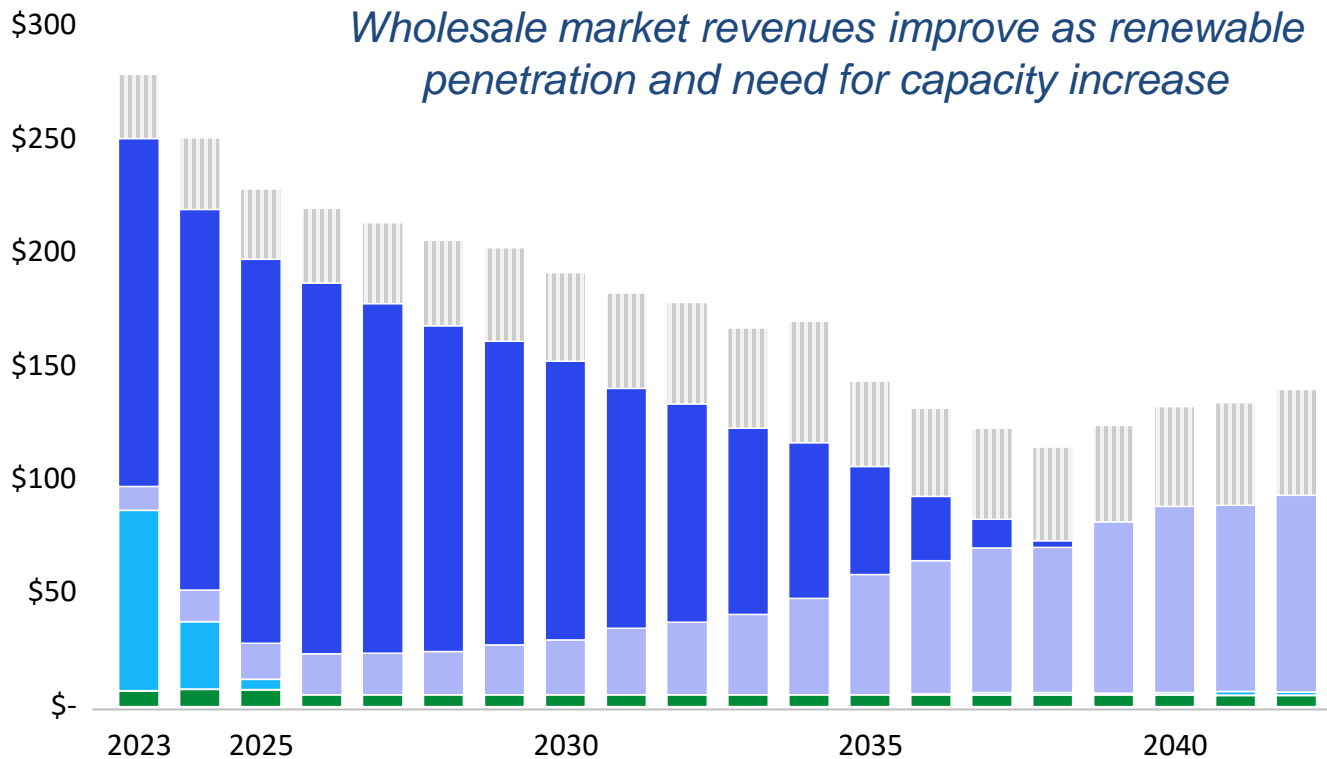


Energy Storage Deployment Challenges

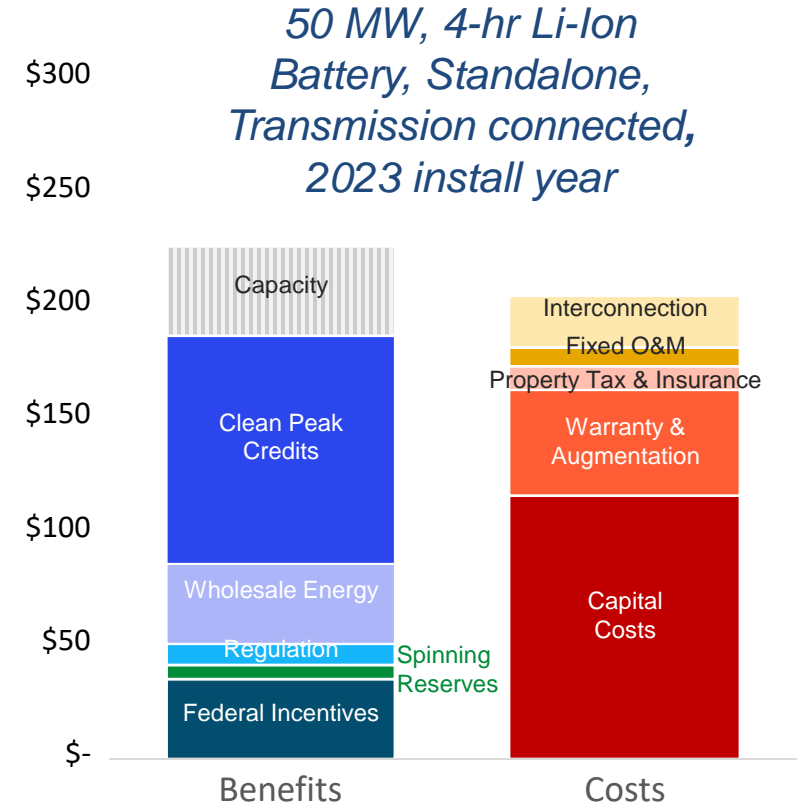
- Commonwealth is not seeing the level of energy storage deployment it was expecting and needs. Developers articulate **three main challenges**:
 - 1) Financing**
 - Focus of this presentation: More **revenue certainty** needed
 - 2) Siting and Permitting**
 - DOER working on energy storage model bylaws and educational materials for municipalities
 - 3) Interconnection**
 - Priority for Commonwealth. For energy storage, DOER intervening in storage operational tariff dockets that involve interconnection policy for the distribution system

Need for Incentives: CPS and Tx-standalone storage

Annual revenues - developer view
(\$2022/kW-yr.)



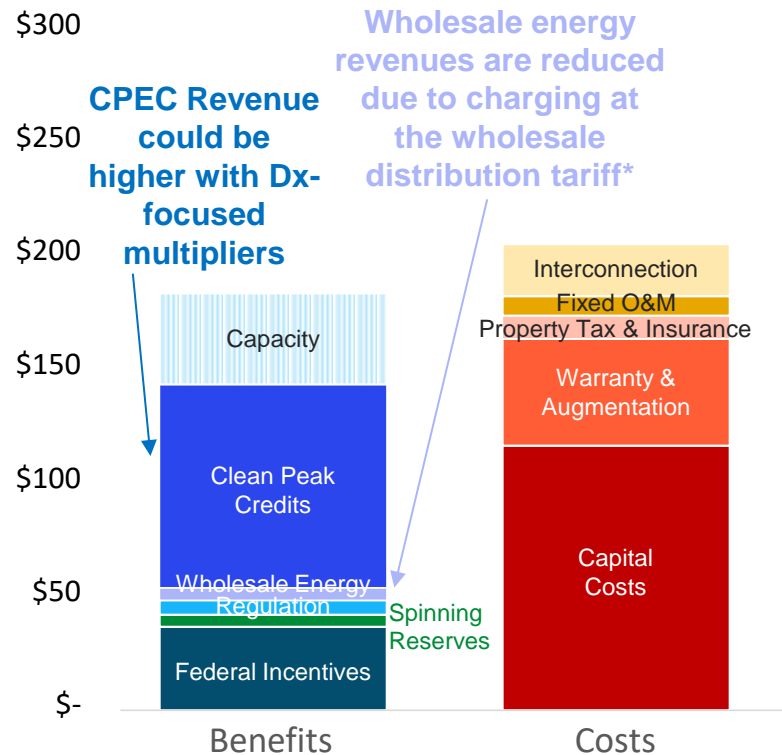
Levelized revenues & costs - developer view
(\$2022/kW-yr.)



- **Challenge:** Lack of long-term certainty in CPS challenges benefit realization

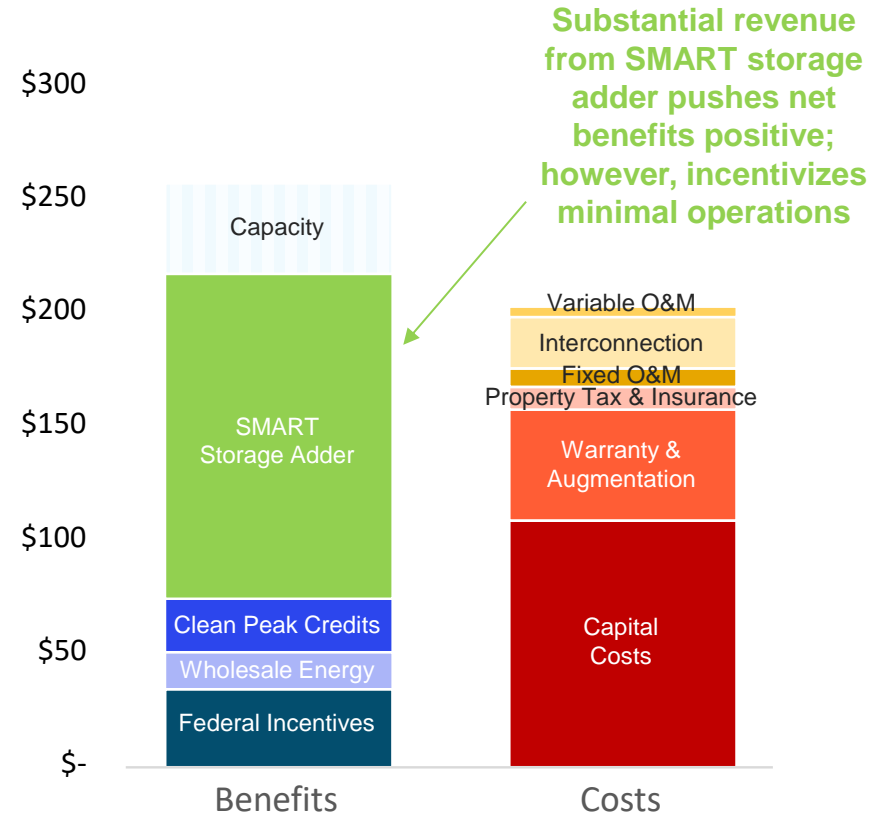
Need for Incentives: Dx-standalone vs. Dx-solar+storage

Levelized revenues & costs - developer view (\$2022/kW-yr.)



5 MW, 4-hr Li-Ion Battery, **Standalone**, Distribution connected, 2024 install year

Levelized revenues & costs - developer view (\$2022/kW-yr.)



1 MW, 4-hr Li-Ion Battery, **Paired with 4 MW solar***, Distribution connected, 2024 install year

*Costs/benefits shown are incremental costs/benefits of storage component of solar+storage installation

Massachusetts Energy Storage Incentive Programs

- Today and for the foreseeable future, to deploy energy storage, **incentive programs are necessary** to fill the missing money gap

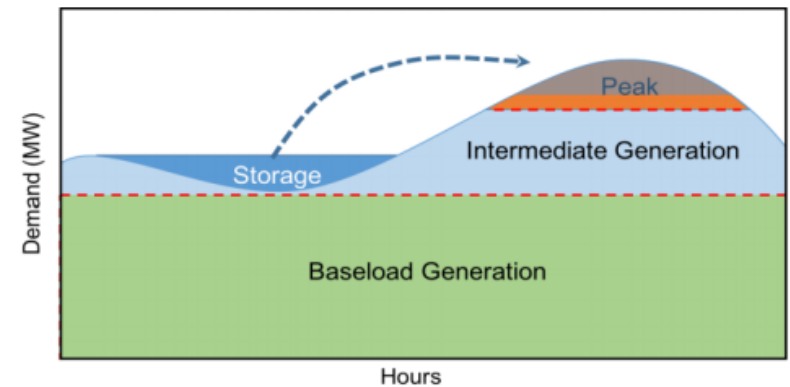
MA's Energy Storage Incentive Programs (All Stackable)

- **Clean Peak Energy Standard (CPS) – Key incentive for Standalone**
 - Incentivizes renewable generation dispatch during peak hours each season; storage that charges primarily from renewable energy qualifies
- **SMART ESS Adder – Storage Paired with Solar**
 - Through DOER's solar tariff program, adder for energy storage paired with solar increases the \$/kWh paid for solar output
- **ConnectedSolutions – Behind-the-meter storage**
 - Demand response program offering incentives based on performance during summer calls. Administered by Mass Save[®]

Clean Peak Energy Standard (CPS)

- **Objective:** Reduce cost and emissions impacts of peak demand through renewables, energy storage, and demand response
- **Mechanism – Market-based**
 1. Eligible resources that generate, dispatch or discharge energy during **Seasonal Peak Periods** will generate **Clean Peak Energy Certificates (CPECs)**
 2. All retail electricity suppliers must annually purchase a certain number of Clean Peak Energy Certificates (CPECs) relative to their load served, called the **Minimum Standard**
- **Seasonal Peak Periods – Late afternoon to evening**

▪ Winter (Dec. 1 – Feb. 28):	4pm – 8pm
▪ Spring (Mar. 1 – May 14):	5pm – 9pm
▪ Summer (May 15 – Sept. 14):	3pm – 7pm
▪ Fall (Sept. 15 – Nov. 30):	4pm – 8pm
- **CPS is the driving incentive for the deployment of large standalone energy storage systems in the Commonwealth**



CPS Participation

Technology	Qualified Systems	Capacity (MW)
Energy Storage	73	206
Demand Response	300	100
RPS Resources	75	38
Total	395	344

Mostly < 5 MW
paired with solar
through SMART

Year	CPS Obligation (CPECs)	CPECs Generated	% Obligation Met with CPECs
2020	179,230	31,189	17.4%
2021	853,961	59,079	6.9%
2022	1,607,008	214,737	13.4%

- CPEC market has been **greatly undersupplied** and this is projected to continue without regulatory changes
- In undersupply, retailer suppliers still obligated by Minimum Standard, and obligation is met through **large Alternative Compliance Payments (ACP)**, costs which are ultimately borne by ratepayers

The CPS Financing Challenge

- **Problem:** Majority of developers cannot secure financing based on CPS. This puts several GWs of energy storage projects with CODs before 2030 in jeopardy and could lead to persistent CPEC market undersupply and high costs for ratepayers through high ACP collection
- Key Financing Challenges within the CPS
 - **Minimum Standard** – Defines size of the market
 - Market is **oversized today** and **undersized** for GWs of storage expected to come online **in coming years**
 - **ACP Rate** – Can always be paid to make a CPEC in lieu of a resource-generated CPEC. **Defines CPEC ceiling price**
 - Prices over time **do not give CPS program enough value** for financiers
 - **Procurement** – Allows for **long term CPEC contracts** and better financing terms
 - Essential for **large energy storage projects**, both **distribution and transmission**

Addressing the Financing Challenge: CPS Emergency Rulemaking

- On **July 19, 2024**, DOER filed a CPS Emergency Rulemaking with the Secretary of State, with changes going into effect immediately
- **Changes**
 - **Minimum Standard**
 - DOER **lowered from 2024 to 2028 to reduce ratepayer costs** by allowing CPEC supply to draw more level to demand
 - **After 2028, DOER will raise Minimum Standard** to absorb projected supply of CPECs from **large energy storage systems** that will be **coming online**
 - **Near-Term Resource Multiplier (NTRM) (2x over 10-year period)**
 - Applies to front-of-the meter, **standalone, distribution-connected energy storage** systems. Many mature projects but face unique challenges compared to transmission counterparts (e.g., higher CapEx, operational and wholesale distribution tariffs)
 - Must have **COD prior to 2027**, total program size limited to 50 MW, and includes 50% per company capacity cap
- **Status**
 - On **August 26**, DOER held a public meeting and closed the comment period on the Emergency Rulemaking
 - DOER reviewed the comments, discussed internally, and elected to make **no changes** to the Emergency Rulemaking
- **Next Steps**
 - DOER filed Notice of Compliance with Secretary of State on **September 24** to close out the process. Will be published in Massachusetts Register **October 11**
 - DOER posted a draft Near-Term Resource Multiplier Guideline on **August 23**. DOER is reviewing comments on the Guideline and plans to roll out the final Guideline and capacity reservation process in the coming weeks

Impacts on energy storage financing:

1. Increasing the Minimum Standard in the long-term provides market certainty to developers and financiers
2. Creating a NTRM will provide a lucrative incentive to deploy systems ASAP between now and 2027

Addressing the Financing Challenge: Next Steps

- DOER also recognizes that changes to the **ACP Rate** and **Procurement** are also urgently needed in order for **GWs of energy storage** to get built and come **online before 2030**
- Stakeholder feedback – Both address making **CPS more financeable**
 - **ACP Rate**: DOER should **increase the ACP Rate** and **remove its yearly declining structure**
 - **Procurement**: DOER should **remove 30% cap** for initial CPEC procurement target and provide a regular procurement schedule. Removing the cap allows a greater diversity of energy storage assets to participate, including both **distribution- and transmission-connected**
- **Next Steps**
 - DOER exploring its options to implement additional regulatory changes as quickly as possible to avoid project delays and cancellations
 - DOER engaged in ongoing conversations about procurement structure and process with stakeholders

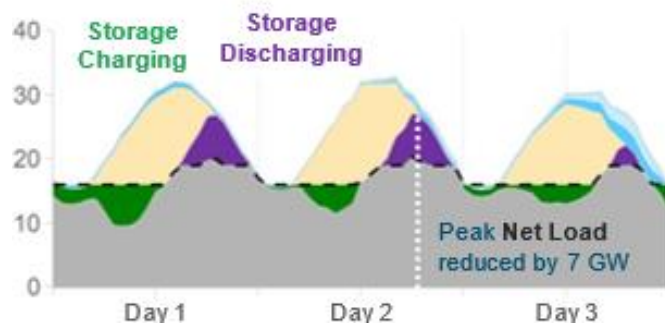
Future of Storage: Evolving Reliability Risks

➤ Energy storage of varying durations can mitigate the Commonwealth's grid reliability risks as it decarbonizes through 2050

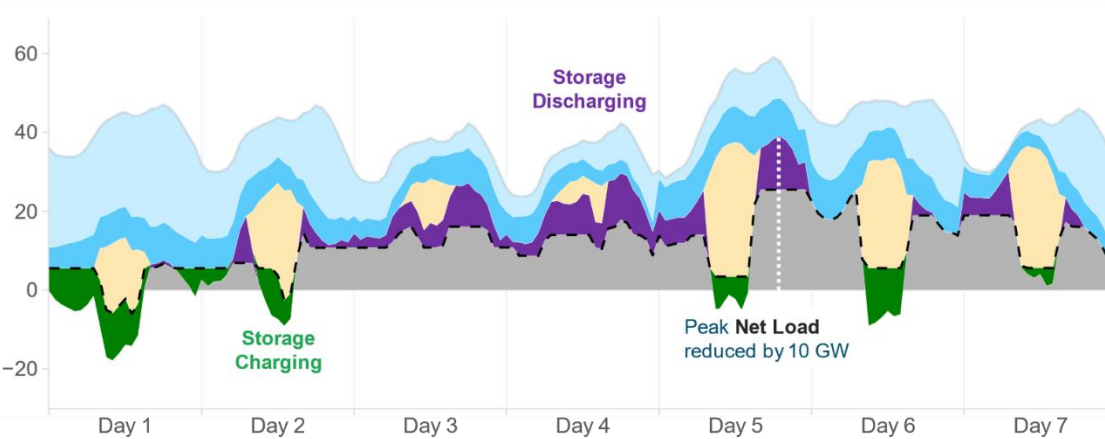
- Over time, reliability challenges increase in duration and move from summer to winter

2030

Renewable Generation and Net Load (GW)

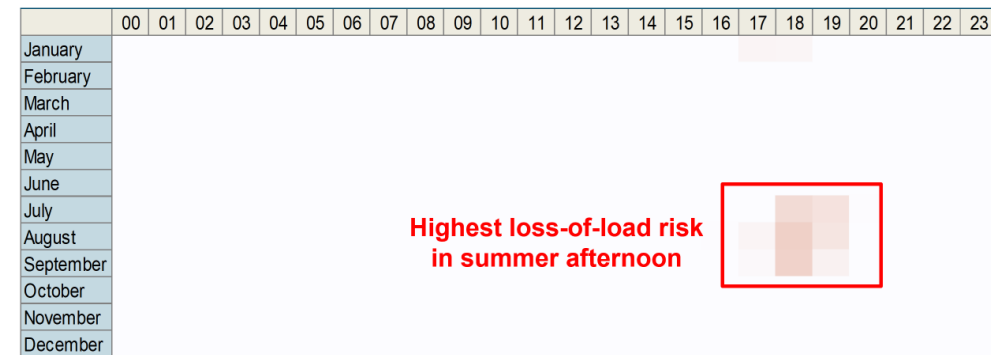


Renewable Generation and Net Load (GW)

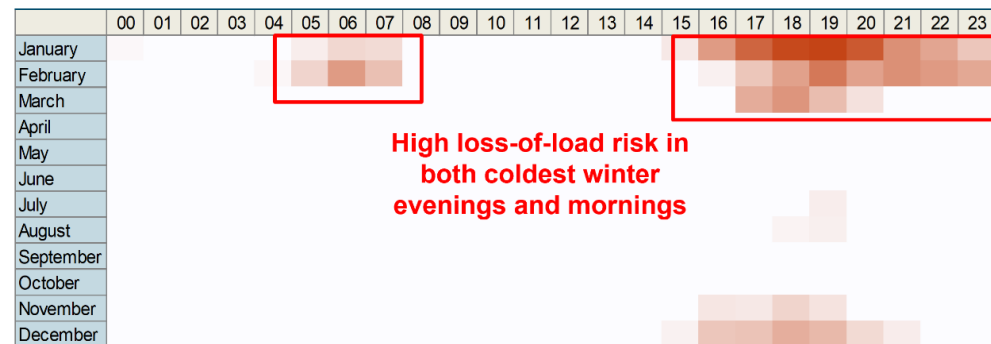


2050

Month-hour System Firm Resource Needs



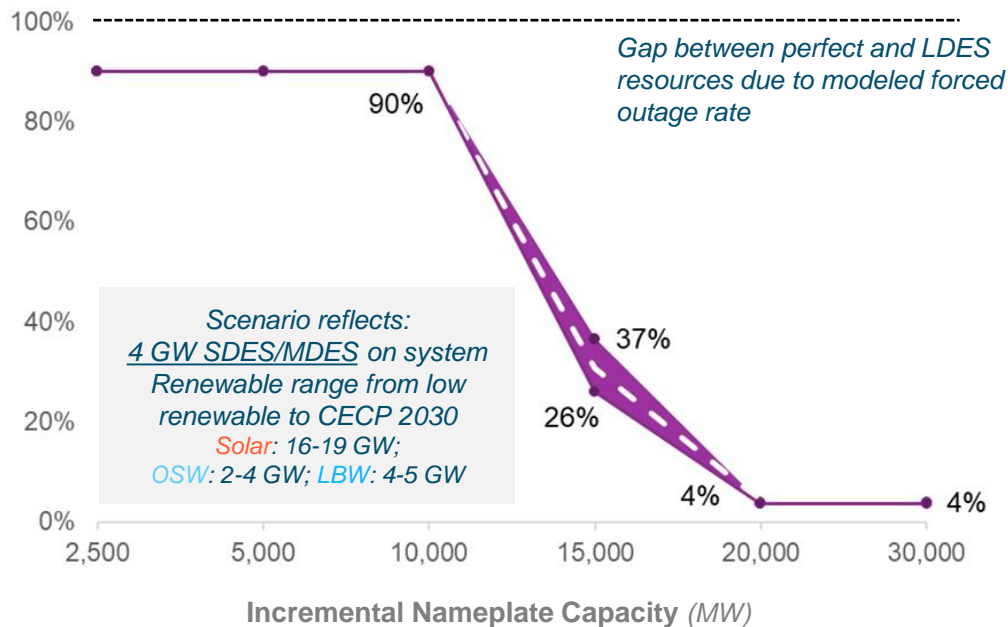
Month-hour System Firm Resource Needs



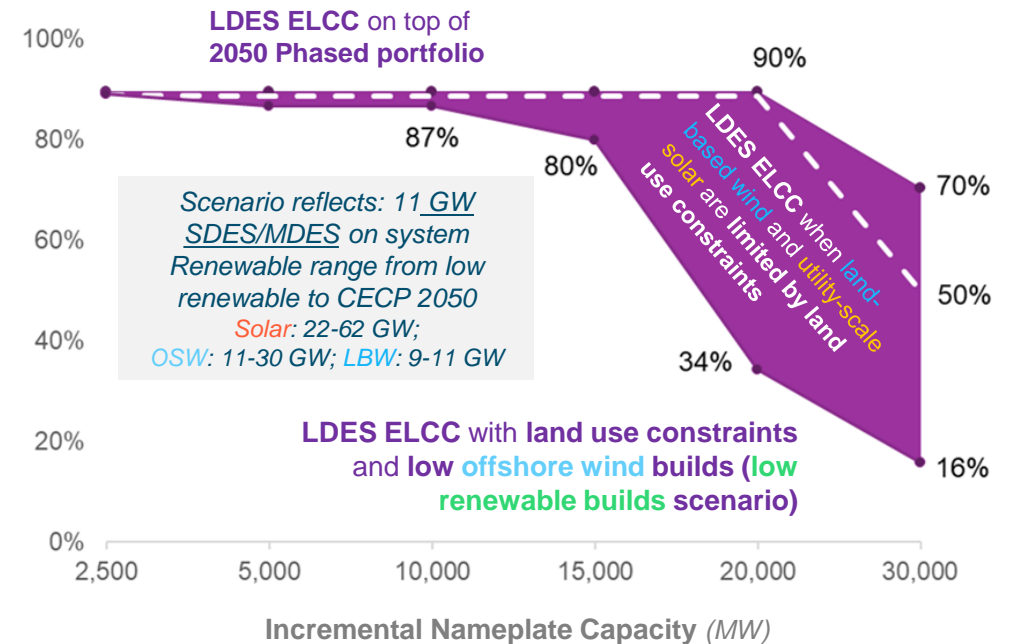
Future of Storage: Capacity Value of LDES in 2030 and 2050

- Long duration (e.g., 100-hour) energy storage ELCC (i.e., capacity value) remains high in low penetrations but then declines sharply at in 2030 as total additions shave peak and flatten the net load profile
- In 2050, the difference between LDES ELCC under CECP phased portfolio and low renewable builds scenario is substantial at higher penetrations when LDES recharging capability is limited, and system requires storage to dispatch even longer for effective peak-shaving

Long Duration Energy Storage Incremental ELCC, 2030 (%)

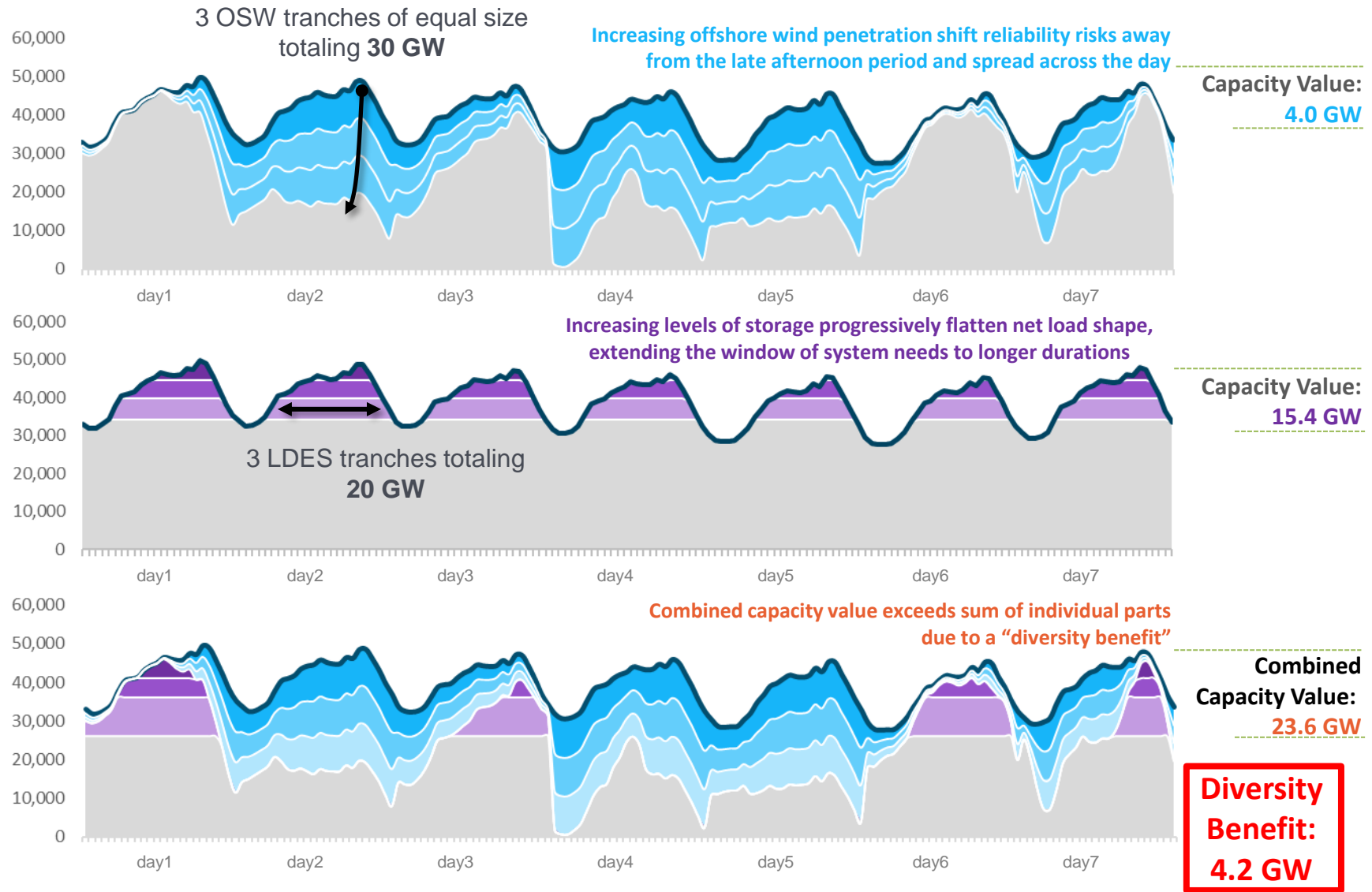


Long Duration Energy Storage Incremental ELCC, 2050 (%)



Future of Storage: LDES Diversity Benefits with Renewables

- The complementary interaction between renewables and energy storage resources can create diversity benefits where total capacity value is greater than the sum of its parts
- Diversity benefit between **Offshore Wind** and **Long-duration energy storage (i.e., duration > 10 hrs.)** is a main driver of LDES capacity value, especially at high penetrations of both resources

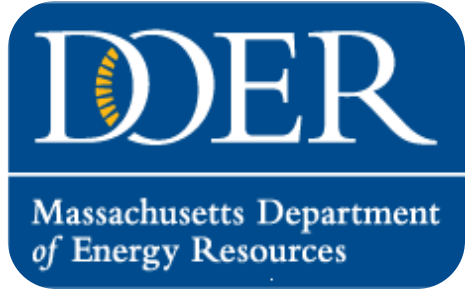


Energy Storage Grant Programs

- **Background**
 - \$50M from collected ACP to promote beneficial use cases of energy storage identified by *Charging Forward* study
 - Programs envisioned for straw proposal
 - **Resiliency-focused** battery deployments at **critical facilities benefitting EJ and LMI communities**
 - **Lowering commercialization barriers** for **mid- and long-duration storage**
 - Encouraging **fossil peaker replacements**
- **RFQ**
 - Issued RFQ on Aug. 21, 2024 for up to \$3M out of the \$50M seeking a Program Administrator to aid in full Program lifecycle, including design, project selection, grant management, and grantee technical assistance
 - Responses due Oct. 11, with anticipated contract execution by late fall
- **Next goals** are to release straw proposal in Q1 2025 and PON in Q2 2025

Impacts on energy storage financing:

Upfront funding will reduce the need for project financing, lowering the barrier to entry for projects.



THANK YOU!

Questions?